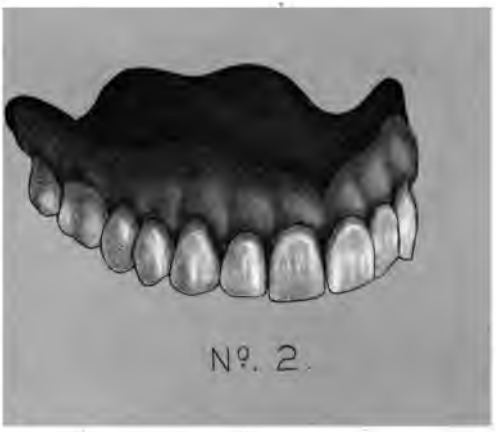
Nº. 1.

Nº. 2.

Nº. 1.



Nº. 2.

INSTRUCTIONS

—IN—

New and Improved Process of Manipulating

GOLD, RUBBER, AND CELLULOID

—FOR—

Dental Purposes,

—BY—

FREDERICK WHEATON SEABURY,

DENTIST,

PROVIDENCE, R. I.

PROVIDENCE:
J. A. & R. A. REID, PRINTERS, 24 Custom House Street.
1884.

PROSTHETIC DENTISTRY.

TO GET a clear understanding of our present purpose, it may be best to commence with a résumé of the history of the art.

About the year 1850 there were two kinds of base-plates in general use, silver for the temporary, and gold for the permanent sets.

The apprentices in those days were sent to the depots to select suitable teeth, usually from a parcel of miscellaneous teeth of all shapes, colors, and sizes. By a careful selection they could frequently make a more natural-looking set of teeth than those now arranged in sets by the manufacturers.

The first were all single plain-teeth; later, single gum-teeth, and for extra nice sets carved blocks were used; the teeth were all soldered to the plates, sometimes with a continuous backing.

The rim or band soldered around the top edge of the plate to lap over the gum was considered a wonderful improvement. The silver plates frequently became honey-combed from the action of the fluids of the mouth, and of course very offensive.

But even those plates which were carefully made and resisted the action of the saliva had to be boiled out in sulphuric acid and water to cleanse them of putrid mucous and saliva; so that the objections to these dentures were: first, expense; second, offensive odor; third, they were unhealthy.

To overcome these defects dentists commenced experimenting with the base metals, alloys, and vegetable bases.

A few of the principal ones were: The alloy called cheoplasty, invented by Alfred M. Blandy (who was a son-in-law of Dr. Chapin A. Harris, then the most prominent dentist in the coun-

try), occupies a considerable space in the dental literature of the time, but it was owing to Dr. Harris' position and not to the merits of this worthless base. The baseness of the cheoplastic alloy was too apparent even to common people.

Gutta-percha, or auroplastic, was used on a gold-wire frame by Drs. George E. Hawes and Asa Hill, in a few cases, which were made prominent in the Cummings rubber law-suit, but it was never of any practical use, as purifying, especially coloring it, so destroys its original texture as to render it useless as a base for plates.

Tin plates were cast by Drs. Boyce and Hawes; they commenced experimenting in 1836, and perfected the process in 1854, but they were unable to control the shrinkage sufficiently. Amber was patented by Deiffenback, April 13, 1858. It was vulcanized by mixing it with sulphur and linseed oil; it was too brittle. Collodion was patented by Mackintosh, in England, in 1860; this was the same material out of which celluloid was afterwards manufactured. It was made in this country by Hill in 1868, who named it pyroxyline.

Rose Pearl was patented by J. A. McClennand, of Louisville, in 1868. He is now manufacturing it in Newburyport.

The more recent alloys are Weston's and Rees'.

Aluminum was the best of these bases, and some few dentists use it now. It is light weight and retains its bluish-white tinge. The difficulty in working it makes it rather expensive. It was patented in 1859.

The objections to these metals, alloys, and vegetable bases were their shrinking and creeping from the teeth, their liability to break and the impossibility of repairing the cast-metal plates, as the solder had to be of a lower-grade alloy.

These objections were overcome by Dr. John Allen, of Cincinnati, who invented the continuous porcelain gum on a platinum base. In his application for a patent, dated Dec. 23, 1851, he also claims the mixing of plaster with asbestos for covering and holding the teeth in position while soldering.

Continuous gum-work is still popular in dental colleges. It has never come into general use, for the reasons, that the process is not easily acquired; the necessary outfit too expensive for a den-

tist with a small business; in an entire set there is a disagreeable clinking when in use; the rigidity of the plate prevents its being adjusted to fit the mouth when inflamed, so that the wearer must either bear the pain or go without them; the uncertainty when repairing; and being more expensive than gold-work, its use is limited to the wealthy.

It is impossible to unite porcelain with any metal without its cracking by shrinking.

Every porcelain tooth, when examined with a magnifying glass, presents a crack around the pin. The difficulty in repairing porcelain gum-work comes from enlarging these cracks by a second heat, as porcelain shrinks after each heat. Manufacturers bake teeth now, with but one heat.

The next in order is rubber, or caoutchouc. Dr. T. W. Evans, of Paris, is on record as the first to use it for dental plates, in a letter addressed to the Massachusetts Dental Society, Nov. 28, 1864, as having experimented with it in 1848. It did not come into general use until after 1858.

Dr. C. S. Putnam made the first dental vulcanizer. His claim is simply a portable apparatus. It was constructed on the same principle as those then in use by the rubber manufacturers. It was a large vulcanizer, capable of doing the work for all the dentists in New York City.

The first vulcanizers sold to dentists were large and clumsy, with rubber gasket packings, which leaked, and frequently blew out. These vulcanizers, when in operation, were watched by the dentist from as great a distance as possible.

The average explosion of Whitney vulcanizers is about one a day. The most serious accident happened to a boy in Louisville, who had his head blown off. The ordinary pressure in a Whitney vulcanizer is about five tons. Out of a dozen dentists who met at my office, there was not one but had had one accident, and most of them several. The fusible plug is worse than nothing, for it makes men careless.

Dr. H. Townsend in 1868 reported the explosion of three Whitney vulcanizers at 280° temperature.

Dr. Whitney, in an article in the *Dental Cosmos*, Vol. XI., Part II., page 561, admits that his vulcanizer is the worst possi-

ble apparatus for curing rubber, and also that there is great danger from explosion, but excuses himself by saying that dentists will not purchase a superior apparatus, several of which he had tried to introduce.

It then required from four to five hours to vulcanize a dental plate, and apprentices were obliged to sit up half the night watching the vulcanizer.

The plates were thick, soft, and porous, usually harder in some places than others, and a dentist who could produce a plate with a polished surface all over was considered an expert.

Putnam's vulcanizer produced better work than Whitney's or Hayes', because the steam was dryer.

The other vulcanizers patented since differ from these only in securing the cover; they were all water-bath vulcanizers, until Campbell's "New Mode Heater" was invented. *The dry oven was Campbell's new feature, but it was only dry when steam was excluded.*

From his experience in manufacturing a rubber box-buggy he realized the importance of using dry steam, but his new heater failed in this respect. So he learned how to work celluloid from Dr. Eben M. Flagg, of New York, and by making superior celluloid and rubber plates in a hot-air chamber, he managed to sell his invention to The S. S. White Dental Manufacturing Co., without instructions.

To vulcanize rubber in a hot-air chamber requires from four to five hours. The product at best is brittle and generally porous.

The "New Mode Heater" is a failure as a practical rubber vulcanizer.

To work celluloid with the heater requires from two and one-half to four and one-half hours, and as it takes only one flask at a time a dentist will need two heaters in order to accomplish much. Rubber plates, covered with tin-foil, and vulcanized in Campbell's hot-air chamber, were the first in which the rubber was absolutely dense and adhered to the teeth, therefore they were the first rubber plates fit to wear in the mouth.

All other plates absorbed or retained the fluids of the mouth the same as their gold and silver predecessors, and they could

not be boiled out in sulphuric acid. The "New Mode" work was the first approach to the desired result, it being cheap and inodorous when perfect.

This was what many thought when they saw the work at the American Dental Convention in Boston, and determined, if possible, to make work like it. I soon learned the only use I could make of the "New Mode Heater" was to dry out plaster investments to mould celluloid, but to do that I was obliged to make a flask with inclined guide-pins.

Then commenced the experiments which resulted in the invention of my inclined guide, removable pin, locked dental flask, and the dry steam, superheated steam, and hot-air vulcanizer.

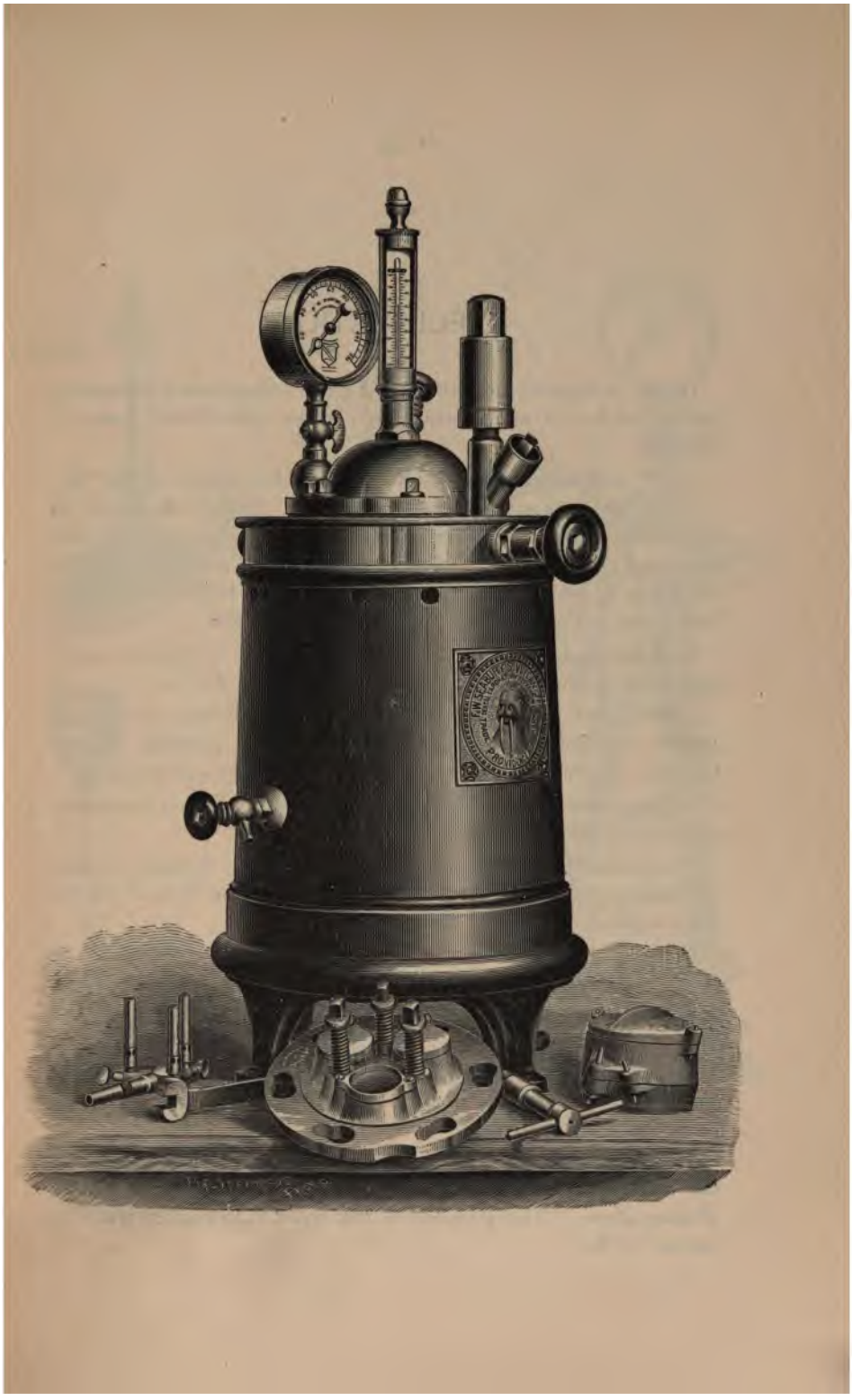
CLAIM.

THE Seabury Vulcanizer and Celluloid Press combines in one apparatus improvements which facilitate the manipulation of both rubber and celluloid.

It will enable the intelligent dentist who does not wish to be restricted to the use of one plastic material to accomplish results never before attained. Rubber and celluloid can be manufactured with this apparatus in less than half the time usually required, and a perfect product assured every time. Both rubber and celluloid come out of the vulcanizer finished.

Cases may be removed from the oven and others inserted at any time during the process of vulcanization with a delay not to exceed five minutes, which is a great saving of time, especially with repair work.

The workmanship and material are the best, and no pains have been spared to make a practical machine, simple and compact, which can not get out of order; and the favorable testimonials of the dentists who have used it are convincing proof that I have succeeded in supplying their urgent need.



SPECIFICATION.

IN the accompanying drawing, Figure 1 illustrates a transverse vertical section of my improved vulcanizer with dental flasks in position.

In the said drawing, A designates the hollow body of the vulcanizer, which is supported on the legs a. Within this body is placed the boiler B, which is formed with the central inverted truncated conical flue C. The boiler and flue are supported by the tubes d, which are connected at one end to the top of the boiler and at the other end to the chamber d^3.

D designates the oven, the lower end or base of which extends somewhat downward into the upper end of the flue C.

The upper end of the oven is formed with lateral flanges d^1, which rest upon the top of the case or body A, and thus support the oven in position, and also form the top of the vulcanizer.

E designates the pressure cover of the oven, which is secured in position by bolts as shown.

e e designate presser-screws, which work through square threaded sockets in the cover and press upon the flask F, in the oven supported upon the disk m.

E^1 designates two lids, which are pivoted upon the cover in such manner as to be readily removed, and by uncovering apertures in the cover permit visual access to the interior of the oven.

G designates a valve, which is seated in the flange d^1 of the oven, so as to close the channel d^2, leading from the pipe d, to the interior of the oven.

H designates a spout, the outer end of it is tightly closed by the cap h, which leads into the tube I, entering the chamber d^3 from above. The purpose of this spout is to convey water to the boiler B.

Fig. 2.

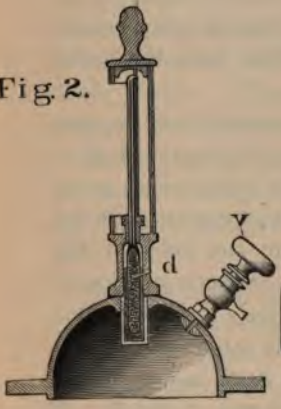


Fig. 1.

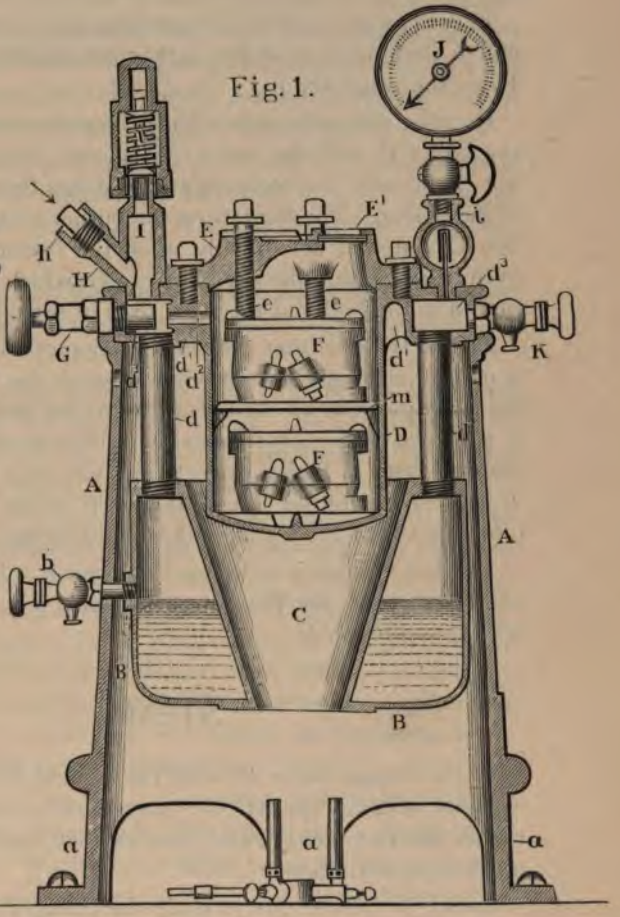


Fig. 3.

Liquid Atoms.	Vapor Atoms.
1. Gravity.	1. Gravity.
2. Latent Heat.	2. Latent and sensible heat.
3. Mutual Attraction.	3. Enlarged volume.
4. Mobility *inter se.*	4. Increased temperature.
5. Non-conductibility.	5. Mutual repulsion.
6. Incompressibility.	6. Diffusion and divergence.
7. Inexpansibility.	7. Conductibility.
8. Negative electricity.	8. Compressibility.
	9. Expansibility.
	10. Positive Electricity.

When the temperature of the vapor reaches 212° the pressure is equal to one atmosphere, or 14.7 lbs.; roughly 15 lbs. to the square inch. Before this temperature is reached we notice bubbles arising. This is caused by the presence of vapor in the water in excess of saturation, but ebullition does not begin until the diverging or self-repellant force of the vapor atoms among themselves and throughout the mass are *in equilibrio* with the converging pressure arising from the density of the water surrounding them.

The point of saturation is commonly called the boiling point, which near the level of the sea is 212° = to 15 lbs. pressure to the square inch.

Ebullition, or the formation of bubbles, is nothing but the sudden aggregation or grouping of myriads of atoms of vapor already formed and existing in the liquid mass, and rushing in contact with some motes or points of foreign matter accidentally presented to them.

These aggregates are composed exclusively of such vapor atoms as are in excess of the saturating quantity.

Now the space above the water is filled with vapor and air at fifteen pounds pressure to the square inch; the air on top of the steam. By continuing the heat we observe that the pressure increases faster than the temperature.

When the pressure reaches 115 lbs. we open the valve G to let out the air in the top of the boiler and tube, and we are ready to commence vulcanizing with high-pressure steam.

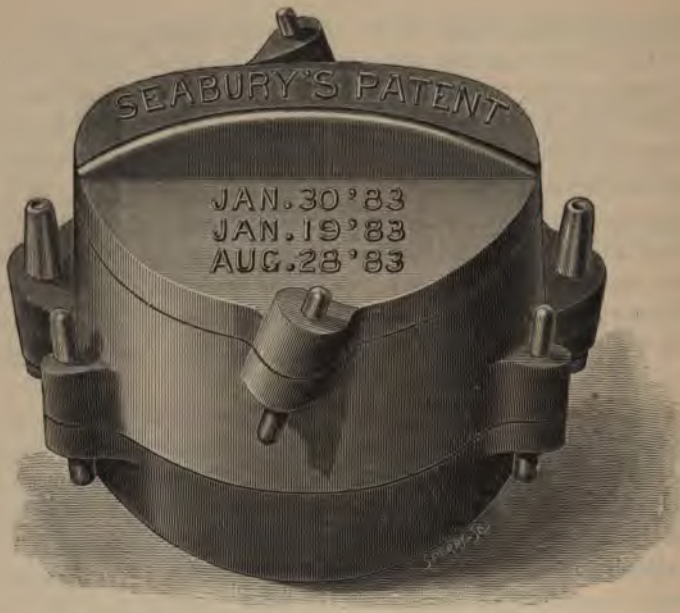
Adjust the solid cover, fill the oven with steam, and close the valve G. Now open the test-cock v in the top of the cover; the steam rushing out will feel moist. If before opening the test-cock we wait a few minutes, the steam will feel dry, or by continuing the heat you can get superheated steam at any pressure or temperature you wish.

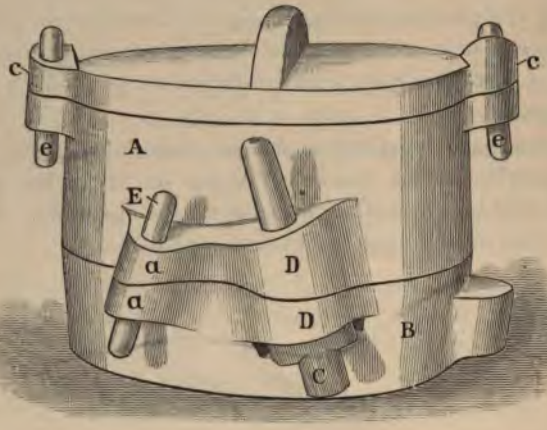
Superheated steam is steam the temperature of which is increased after it leaves the boiler. Steam generated in the boiler carries with it into the oven water in the vesicular state; that is, in minute globules or innumerable particles. In the hot oven these small globules are expanded into vapor, thus making a pure gas.

The fire coming in contact with the bottom of the oven causes a perfect circulation and equality of heat in all parts of the chamber. Water baths and hot-air flues do not affect a circulation, which is the one essential thing. Water retards, and sometimes under pressure prevents, a circulation because of its cohesiveness and density, which is 830 times greater than that of superheated steam. In a water or steam bath the heat applied goes to form additional vapor atoms, which increases the pressure and decreases the mobility of the mass. Steam loses heat by expansion and radiation. Surface condensers are the only true ones. Steam at high pressure parts with its heat very slowly by conductivity.

During the process of vulcanizing it is necessary to have a certain degree of heat and an equivalent amount of pressure. To assure this I furnish a very sensitive thermometer and an accurate steam-gauge.

To prevent accidents and explosions, from neglect and carelessness, I provide a Pop Safety Valve, set at 120 lbs. pressure, so that it will be impossible to blow up the machine. By using all three, the accuracy of each may be proved.


SEABURY'S PATENT
JAN.30'83
JAN.19'83
AUG.28'83


c
c
e
e
A
E
a
D
a
D
B
C

THE SEABURY DENTAL FLASK.

MY improved flask is used for the purpose of uniting artificial teeth to artificial gums under pressure.

It consists in providing the flask with guide-pins inclined at such an angle that when the upper part of the flask or cope is forced down to imbed the teeth into the gums, it will be moving at such an angle as to allow the projecting alveola ridge to reach its final position without breaking the plaster investment.

It also consists in the peculiar and novel construction of the guide-pins, by which they can be quickly removed from the flask by a partial rotation of the pin.

Finally, locking-pins are placed at one side of the guide-pins, so that when the cope of the flask is forced on to the nowel or lower part, the lock-pins may be forced into place and thereby lock the flask. The cover is secured by dove-tail lock-pins and can be easily removed. With this improved flask a stronger, better finished, and more durable plate is produced then is possible with the flasks now in use.

In the accompanying drawing, A is the cope or upper part of the flask. B is the nowel or lower part of the flask. C is the oblique guide-pin inserted into holes formed in the projections DD on the flask. E is the locking-pin inserted into the holes formed in the projections a a at an angle opposite to those formed in the projections DD.

It is desirable that the top plate should be held in place while being handled, and during the process of vulcanizing for that purpose I form the dove-tail c c, locked by the pins e e.

The cam-pins C are right and left, and are secured in position by rotating them towards the front or narrow end of the flask. The pins should be kept oiled.

RUBBER.

AFTER thirty years' experience the successful manipulation of rubber is a secret.

Most of the information distributed in books, essays, and letters-patent is either unimportant or misleading.

No definite process of any value for the manufacture of dental rubber has ever been made public.

Judging from the product there are but few good receipts for making red dental rubber in this country. By good dental rubber meaning one of pure color, free from dirt and specks, not mottled, and taking a high polish. When we buy dental rubbers we cannot tell, without a chemical analysis, whether the pigments used to produce the color will be injurious in the mouth or not.

With the water-bath vulcanizers now in use it is impossible to distinguish a pure, clean rubber from one of low grade stock, loaded with dirt and pigments. When the several red dental rubbers now on the market are vulcanized in the usual way in a Whitney vulcanizer, they have to be marked before they are put in to vulcanize, in order to distinguish them when taken out.

Intelligent experiments cannot be conducted with a Whitney vulcanizer, or with one constructed on the same principle.

The first thing to do then is to get a process of vulcanizing which will develop the color. It has been known for years that this could be accomplished by keeping the rubber absolutely dry, by sealing with tin-foil, baking in a hot-air chamber, or curing with superheated steam.

When rubber shrinks it is either because it has not been properly seasoned, both after washing and after mixing, or it has been packed and vulcanized in a water bath.

The water will separate the rubber from the teeth every time, so one can get the shrinkage only in a dry oven. Superheated steam applied instantly is the perfect medium for conducting heat to rubber, because it gives the best color, and preserves the elasticity of the rubber. Being a rarefied gas, the indicated is al-

ways the actual temperature for all parts of the oven, and rubber need never be burnt, made granular or porous. That is to say, in order to vulcanize rubber properly the steam generator must be separate from the vulcanizing chamber, so that the high-pressure steam can come into the chamber instantly, to produce pressure before the heat can be communicated to the rubber.

Rubber softened under high pressure is never porous. To avoid moisture from condensation the oven must be heated independently of the generator. In other words, in all of the rubber vulcanizers built, except the Seabury, the vulcanizing chamber is a condensing chamber and not a superheating chamber.

To harden dental rubber appears a simple matter enough, but to do it so that it may maintain its best qualities is more difficult than most persons suppose, and a large part of the rubber dentures manufactured are either over-steamed or insufficiently hardened.

For this there are several reasons:

First, It is found that as the pressure of steam increases the conducting power decreases, and heat tends to accumulate near the point of application.

Second, The air in the top of the vulcanizing chamber protects the thermometer from the steam, as air when still is a non-conductor.

Weildman, by opening a safety-valve in the top of a Whitney vulcanizer, increased the indicated pressure thirty-five pounds to the square inch by causing a circulation.

Rubber manufacturers when vulcanizing keep blowing off steam, thereby causing a circulation and equality of heat in all parts of their long ovens.

Third, When water comes in contact with rubber it destroys the color, makes it soft and porous, and also prevents it from adhering to the teeth.

All authorities agree that to get the best results when vulcanizing rubber, the temperature of the vulcanizing chamber should be gradually and slowly raised. My process is just the opposite. I commence with dry steam at high pressure and high temperature, and I claim that rubber cured in this way is tougher, takes

a higher polish and makes a closer union with the teeth, produces a lighter and brighter color, and requires less time to vuleanize and finish.

TAKING IMPRESSIONS OF THE MOUTH.

MAKE a thorough examination, using the forefingers to distend the cheeks, to see the attachment of the muscles and soft tissues. Select a tray which, when placed in position in the mouth, will not press the buccinator muscle and other soft tissues out of their normal positions, and about an eighth of an inch larger than the jaw at every point. Warm a sheet of wax large enough to fill this space, and press it into the tray, which has been previously warmed sufficiently to make the wax adhere. Then insert the tray and wax into the mouth by grasping the handle between the thumb and forefinger of the right hand (if you are right-handed), place the hand against the patient's right cheek for upper, and left cheek for lower impressions, then distend the opposite corner of the mouth with the forefinger of the left hand, rotate the tray and carry it into position, with the middle finger of the right hand placed under the centre of the tray. Stand behind the patient for upper, and directly in front for lower impressions.

Take the tray out and trim the wax to the form you intend to make the plate. Pinch up a ridge of wax at the back, across the palatine arch, so that the wax will press there tightly. Score the wax with a knife lightly all over, so the plaster will adhere.

For any inflamed or soft tissues, the rugæ especially, there should be corresponding cavities cut in the wax. This is the one great advantage of using wax and plaster. Mix a little plaster and water, use salt or potash to cause it to set quickly. Distribute about a teaspoonful the consistency of cream evenly over the wax. Have the patient rinse the mouth with water, then carry the tray into position as you did with the wax. Keep the patient's head tipped forward and downward. When the plaster sets distend the cheeks with the fingers, and the tray can be easily removed.

In lower impressions, after the wax has been pressed into place,

run the finger around by the side of the tongue to press the wax against the jaw. Push the tray back into the throat, and lift it out, then it will give the dovetail undercut which is in most mouths. The undercut is of great assistance in retaining the plate in position.

In partial cases cut the wax out around the teeth, use thicker batter and more of it, so when it fractures in removing from the mouth, the pieces will be thick enough to stick together with jewelers' cement.

I prefer stucco-workers' plaster, best quality, for all purposes.

Trays should be bent, cut, and filed in every case when they do not conform to the above directions.

The impression must be perfect, no matter how many times you have to try.

Boil the wax in a large kettle of water; the foreign matter and impurities will collect on the bottom of the cake, and can be scraped off. By doing this the same impression wax may be used many times.

Working Rubber.

From the impression a plaster model is obtained by first coating the impression with several thin washes of brown shellac; when this is hard, with the finger smear the shellac with tallow.

Into a half-pint of water sift plaster gently and slowly, giving each layer time to become saturated with water; when about the consistency of cream, with a wet knife fill the impression, wait for the batter to stiffen, then build to the proper shape. Remove the model from the impression, and if an air-chamber be required, mark with a lead-pencil the outline, on a glass place water and plaster, with camel's-hair brush wet the model and add plaster and water, form with the brush to the desired thickness.

Adjust the gutta-percha trial plate, the thirty-second of an inch thick, by immersing it in hot water. Imbed a stiff copper wire across the back of the palate or on the top of the lower ridge to stiffen the gutta-percha.

Circle a piece of warm wax about the size of your finger around the alveola ridge with a hot spatula; stick it to the gutta-

percha and trim. Insert the trial plate and wax into the mouth. and get the "bite" or articulation of the jaws. Secure the trial plate to the model with wax or cement, and put it in an articulator. Arrange the teeth, after which, when possible, try them in the mouth. Wax the teeth up just as you want them when finished, smooth the surface of the wax with a mouth blow-pipe, the end placed in the centre of the flame so as not to focus the heat. Heavy tin-foil may be burnished to the trial-plate if you wish the rubber plate to come out finished. Imbed the model with trial-plate attached in batter in the nowel of the flask, the top rim of the plate should be on a level with the edge of the flask, shellac the plaster and grease, then put on the flask ring and lock it, mix plaster as before and nearly fill the ring with batter, then grasping the flask pound it hard against the bench, sift in dry plaster to absorb the water, and continue the process until the plaster is hard and dry, then put in enough batter to bed the cover. In about thirty minutes take out the guide and lock-pins and open the flask. Remove the trial-plate and wax, lock the flask and place it in the vulcanizer, dry it out thirty minutes, pack rubber around the model, close the flask with the presser-screws, lock, put on the solid cover and vulcanize one hour at 115 lbs. pressure and 340° of temperature.

Rubber sets and repair jobs invested in an ordinary flask and packed in boiling water, can be vulcanized three an hour for every hour in the day.

When using tin-foil I prefer paraffine to gutta-percha and wax.

In using my flask for lower partial cases, fill the centre space of the model with batter to a level with the teeth and depress the front of the model, then the cope when forced to a seat on the inclined guides will exert direct pressure on the rubber packed behind the front teeth.

CELLULOID.

THE testimony of those dentists who have used celluloid continuously for years with entire satisfaction, agree in attributing their success to moulding at very high temperature, about 300° Fahr.

Attention to little things is the secret of success with celluloid. I have made a large number of celluloid plates for the past three years by the following method, to the complete satisfaction of my patients. I have yet to see the first plate discolor, warp, or break.

The odor of camphor and tartar may be removed by immersing the plate in cold sulphuric acid and water.

The plates by this method come out of the investment finished.

Celluloid must be moulded on metal dies in a dry oven; steam makes it porous and should never be used. Coarse, slow-setting plaster is absolutely necessary.

There is but one right way to make a celluloid dental plate. First, shape the model so that it will draw out of the sand easily and coat with sandarac varnish. Deep undercuts should be filled with plaster cores, which, after being dried slowly, will leave a smoother surface on the metal than sand would. Stop pouring the tin the instant the mold is covered, as the smaller the tin model is the better. Place the model thus made in the nowel and file it until it rests on the bottom without touching the sides. Warm a sheet of paraffine and wax, and stretch it as thin as it will bear without parting; place this on the tin cast, which has been previously warmed; trim to the desired shape; apply cold water, and it will come off the tin without sticking. Remove from the articulator the gutta-percha trial-plate and wax with which the bite was taken, and in its place adjust the plate which was fitted to the tin cast. Set the teeth up by dropping the melted paraffine and wax over them; chill the mass in cold water, and use a mouth blowpipe held in the centre of the lower cone of the flame of a Bunsen burner to soften the surface where carving is desired. After carving, run a bead one-sixteenth of an inch wide around the top of the gum. Change from the articulator to the warm tin model; press carefully into place; run a little paraffine around the edge, being very careful to exclude all air and water from between the paraffine and tin. Try each tooth to see that the paraffine adheres; otherwise they will be moved out of position when they are invested in plaster. Burnish tin-foil lightly but smoothly to the paraffine, and stipple all over with a serrated plugger. The bead of paraffine covered with tin-foil should be one-quarter of an inch above the plaster which holds the tin model

in place, and the plaster should then be sloped to the edge of the flask.

To get the position and angle of the tin model, before pouring the plaster into the nowel, place the model in position on a framework of matches. These matches will remain in the plaster, and will serve to support the heavy tin model in its correct position, no matter how soft the batter may be when poured. When the plaster sets, shellac and grease those parts not covered by the tinfoil. In placing the model in the nowel, be careful to place it as near the back of it as possible without touching. (Figure 3.) If this has been done and the top ring put on, there will be a space between the teeth and the ring wide enough to run your finger around; larger sets, of course, will leave less space.

Now comes the all-important part, which, if slighted, will take ample revenge. Fill a pint-bowl nearly full of water. Place a tablespoonful of plaster in a fine sieve and shake it gently over the water; each atom of plaster when saturated with water will sink, so shake slowly, giving each layer time to become saturated. If a cake is formed, it will sink to the bottom as dry plaster, which will form bubbles, making the cast porous, and invariably cause the celluloid to be porous also. Stir occasionally with a wet knife. Continue till about five or six tablespoonfuls have been sifted in, when the mixture will be about the consistency of cream. Let it stand five or ten minutes, and pour off the surplus water. Pour the plaster into the flask at the corner, in a small stream, guarding the teeth with the plaster knife, so that the plaster will strike the shellac first and rise slowly around them. When on a level with the ends of the teeth, stop pouring; then, grasping the two parts of the flask between the thumbs and forefingers, pound it against the bench for five minutes. This will cause the plaster to settle and the water to rise. If any bubbles do appear, you have made a mistake somewhere. Take a pinch of dry plaster between the thumb and forefinger, and scatter it evenly around the edge of the flask. Now repeat the process of pounding and applying dry plaster (at the edge only), until all the water is absorbed and the investment is dry, then fill the flask with soft batter, and put the cover on. If plaster falls into the centre of the investment first, it will form a cake and prevent the

water from rising. The more time the investment has to set the better; therefore, it is well to invest the last thing before leaving the office; then you can easily finish by noon the following day.

It is necessary to have an inclined-guide, removable-pin flask. Remove the pins, and the flask will easily open without breaking the projecting investment over the alveolar ridge. A small stream of boiling water from a coffee-pot will wash out the paraffine, exposing the tin-foil. Close the flask and leave it in the oven, the top side of the flask down, until the thermometer registers 320°, which should take one hour and a quarter when the machine is cold and fifteen minutes less when hot, by which time the tin and plaster investments will have reached that degree of heat. Be sure that the celluloid blank touches the palatine surface of the cast. If it rests only upon the ridge, the flask cannot close, as celluloid does not stretch or flow. In a majority of cases, a number six blank will have to be used; shorten and file to fit. The palatine portion of the blank must be thinned to the one-thirty-second of an inch by scraping. If on applying a wet finger to the tin cast there is a hiss, it is too hot. Let it stand for a few minutes. When sufficiently cool, place the flask containing the celluloid blank in the heater. Apply pressure very gently at first. In from five to ten minutes the flask will close. In any case, do not continue the heat in the machine longer than ten minutes.

When the flask is closed, lock, remove from the oven and place it in water until the plaster is soft. If with a knife or other suitable instrument you cannot pry the celluloid off the metal cast, put it in a tin basin of cold water over a flame. The tin cast will heat before the water boils, when the plate may be easily removed.

No. 3.

No. 4.

Celluloid Gum on Rubber Plate.

Arrange the teeth in the usual manner, leave the front and sides of the roots exposed. Run a bead about one-eighth of an inch square around the edge of the trial-plate. Invest in a flask in the usual manner, pack with rubber, and vulcanize forty-five minutes, or sufficiently for the plate to retain the form. When removed from the plaster investment the case will present the same appearance as shown in Figure 1, front page. With a chisel straighten and undercut the rim, run a burr through between the teeth. To put the gum on, fill the groove with paraffine. Invest the plate teeth down (Figure 4), exposing only the paraffine, otherwise when the rubber softens the teeth will move out of position. The plaster in the cope is used as a form to press the celluloid into place; the bottom edge should be beveled out so as not to push the celluloid strip down and away from the groove. Lock the flask, dry it out in the oven one and a half hours when the machine is cold and fifteen minutes less when hot. Saw off the rim of a celluloid blank, boil it in water, press it into place, put on the cope and mould in the oven. Little or no pressure should be applied for the first five minutes, to allow the celluloid time to soften, then with the thumb and fingers turn the T wrench very gently. At the end of ten minutes turn the heat off. When the flask is closed, lock, remove from the oven, and immerse in cold water.

To Adjust the Vulcanizer for Use.

Open the test-cocks b and k, remove the cap h, pour clean water into the spout H until it escapes through the test-cock b. Replace the cap h, turn it to place with the fingers. If it should leak when steam is up, tighten it very gently with the T wrench. Close the test-cock b after the excess of water has run out.

Place the gas or gasoline-burner so it will heat the oven and boiler at the same time, when you wish to vulcanize. I generally use one burner under the boiler the other in the flue.

For celluloid place the burner in the centre of the flue, elevate it if necessary on a box, that as little steam as possible may be

generated in the boiler. The pressure of coal-gas varies in different places; a little judgment is necessary to vary these instructions to suit each place. It takes less than thirty minutes with cold water, and less still with hot water, to get 120 lbs. pressure of steam. When steam is up it requires very little heat to keep it.

THE WATER should be renewed every morning the first thing, or sometime the pressure will decrease apparently without any cause.

Close the test-cock k when steam escapes, and not until then. When the pressure reaches 120 lbs. the pop-valve i will blow, at first too freely; a gentle tap on top will seat it.

The valve G is packed with asbestos; a piece is sent with each machine. If the packing leaks tighten the screw gently. When the screw reaches its seat turn it back, oil some asbestos, make two or three turns around the stem and press it in so that the screw will catch. Turn this screw very gently, or you will bulge the barrel. The asbestos will wear one year to my knowledge and look as fresh as new.

When operating the machine in vulcanizing, the valve G and test-cock v should be opened gradually and slowly. By opening the valve G quickly the rushing steam will syphon water from the boiler into the oven. When vulcanizing there is 115 lbs. pressure inside the flask as well as in the oven. By instantly turning the test-cock v wide open, the pressure is removed from the outside of the flask, and the pressure then comes from the inside, which it is least able to withstand.

On the inside of the oven, midway from top to bottom, are four brackets to suspend THE DISK M. On the bottom side of this disk are two small projections which fit between the brackets under the steam gauge and thereby keep the disk stationary. On the upper side of the disk, above the small projections, are two large projections placed so as to receive the square projection on the broad side of nowel; it holds the flask when under pressure directly beneath the three presser-screws. When it is in the right position the lock-pins of the flask will come directly under the holes EE in the presser-cover, through which the pins are driven home in locking. On the bottom side of this disk, in the centre, is a groove cut to receive the ridge of the flask placed on the bottom to keep warm while moulding celluloid or rubber

in the other flask. When drying out or heating up the investments the disk is left out of the oven. When heating up celluloid investments put the flask in bottom side or nowel up, because there being more plaster in the cope, it requires more heat than the nowel with the metal die. In rubber, rubber and celluloid, and gold and celluloid, pnt the flask in bottom-side down. The flask being in position, put on the presser-cover, the small curve in the circumference fits the siphon bulb, with the bar wrench tighten the cover bolts by giving each a half-turn in succession until the cover is seated, then with the T wrench turn the presser-screws gently. The bar wrench must never be used on the presser-screws. The presser-cover is only used when moulding. For drying out, heating up, and vulcanizing use the *solid cover*. Place the solid cover in position, first see that the GROUND JOINT is perfectly clean, tighten the bolts by giving each a half-turn successively; *the bolts must go down evenly or the joint will leak*. Smear bar-soap on the ground joint occasionally.

Before putting the flask into the oven TO MOULD, always insert the lock-pins into the holes in the cope, then, when the flask is closed, they can be easily driven down.

A person who has made a mistake will generally preface the apology with "I thought so and so." Remember to suspend your thoughts until you are perfectly familiar with these instructions, which, if followed, will produce a perfect result. These were compiled from an extensive correspondence on the subject, and I therefore feel confident that most of the difficulties have been anticipated in these pages. I will, however, at all times, cheerfully answer questions.

ÆSTHETIC DENTURES.

BY PROF. THOMAS L. BUCKINGHAM, M. D., D. D. S.

WITH the introduction of rubber as a base, and of sectional blocks made by the manufacturers, the old process of mounting teeth on metallic plates was in a great measure discontinued. While the new process was, to some extent, an improvement on the old, it prevented the advancement which would have taken place had it not been introduced. It requires much skill and nice workmanship to mount a set of teeth on a metallic plate; and when the teeth have to be carved, burned, and ground to fit, and arranged to give the proper expression to the face, it requires more than ordinary skill to perform the task properly. Teeth are now manufactured in quantities, and all that is required of the dentist is to select such as will come nearest to suiting the case. The fitting to the plate is dispensed with; in fact he does not want them to fit closely to the gum, because the rubber will fill the space. All he has to do is to make close joints and finish smoothly. He may vary the color and size for the different cases and make some a little longer or shorter than others, but they all have the same regular form, and look as much alike as shoes, hats, or other articles of dress that are sold in the stores.

Natural teeth vary in shape, size, color, and arrangement. If you were to examine all the mouths in this city you could not find two exactly alike, and one of our objects in inserting artificial teeth is to imitate nature. It is therefore evident that teeth made in sectional blocks and arranged as they have to be in regular order cannot imitate natural ones.

Why cannot artificial teeth be made to resemble natural ones? The shape, size, color and arrangement are under our control. *To obtain the best results we must not use sectional blocks—we must have single teeth.* Let us see what is within the reach of

every dentist who has talent enough to accomplish what he undertakes in artificial dentistry.

First, we have the porcelain composition, which can be made to imitate the natural teeth so nearly that they cannot be told at a very short distance. We have also compositions to imitate the gum near enough to avoid detection. With these we ought to be able to construct teeth that would very nearly resemble the natural ones. Single teeth are also made, very closely resembling the natural organs. In making moulds for them the manufacturer selects the best-shaped natural teeth for patterns, and the color is very near like that of good, healthy natural ones. But natural teeth are not always regular in shape nor are they always uniform in color in the same mouth, and by use they are worn on the cutting edges of the front and the grinding surfaces of the back teeth; so that in a person's mouth of over forty the teeth present a very different appearance from what they did at eighteen or twenty years of age.

As it is our object to represent the natural organs as near as possible, we should grind the teeth off as much as natural ones are worn. The practice is not to grind the teeth on the cutting or grinding surfaces. I say grind them all over if necessary; make them the shape you want; then if the ground surface is polished with pumice on a buff and finished with rotten-stone and oil, a better surface can be made than they possessed when they were burned. So by grinding and polishing we can make *single teeth* any shape we wish.

In regard to the color, it is sometimes impossible, with all the varieties there are in the depots, to match the color of some natural teeth. By selecting such as have the color of the body of the natural tooth and using some mineral paint, a tooth can be made to match almost any natural one. Porcelain painting is now so common that the prepared colors can be purchased at any store where they keep artists' materials. Forty years ago they painted all porcelain teeth. When first burned they came out as white as beans and of nearly the same shape. They were then painted and burned again.

In setting an artificial tooth alongside a natural one that has been badly decayed and filled, and perhaps is black on the side opposite the filling, the neck green and the edge blue,— it is

impossible to match such a tooth unless we color one. If a tooth is selected of the color of the body of the natural one, ground and fitted to correspond in size and shape, and then painted to match, it may be made to imitate the natural tooth so closely as not to be detected. The painting may be done by any dentist who has skill and taste enough to make a good set of teeth. The mineral colors change very little in burning, unless they are heated more than is necessary. The burning may be done in a muffle; one of the small furnaces used to make continuous-gum work is the best. If the dentist has not one of these he can use a clean crucible, heating the teeth to a full red heat in an ordinary fire; or they may be burned on a piece of charcoal with a blow-pipe, using a naked flame. All that is required is to heat to nearly the melting point of silver, when the silicious compound with which the paint is mixed fuses and forms an enamel.

After selecting and preparing the teeth to suit the case, the next thing to be done is to arrange them. This requires more than ordinary talent to accomplish properly. Almost any mechanic with a few hours' instruction can put up a set of *sectional blocks on a rubber base*, and they will be as regular and beautiful as a row of piano keys; but to make teeth irregular and give them a natural appearance to harmonize with the other features of the face requires the talent of an artist. The dentist should not be satisfied when he sees that the teeth are not too short or too long, are the right color, not to large nor too small, or that they articulate properly. They may be right in all these essential points and yet have a very artificial appearance. He should take pattern after the portrait-painter: commence with the patient present and notice not only the teeth, but all the expressions of the face, and arrange the teeth to harmonize with the features so as to give the best expression to them. A photographer sets his subject in a chair so as to get the best light, places the head in a fixed position and takes his picture. Everybody knows that a photograph gives no expression; it is only a picture of the person when he is in a quiet, passive condition. The portrait-painter will not only give you a picture, but will give expression to it; a little twinkle in the eye or a slight elevation of the lip is transferred to the canvass, so that you not only see the form but also the character of the person. As the artist is not always

called upon to paint a beauty or persons of a similar cast of features, so with the dentist. If our patients were all alike in form and expression we might have sets made to suit them. It is not necessary for me to call your attention to the deformity when the natural teeth are lost. The face is then shortened from one to two inches, the lips fall in and the chin comes up to meet the point of the nose, and every muscle of the face below the orbit is changed. Persons who have lost their teeth cannot smile or give a pleasant expression, their cheeks are wrinkled, they have no lateral motion to the under jaw, and in eating they can only roll the food into masses and swallow it without mastication. In fact, they would be horrible to look at if we were not so accustomed to seeing them. A writer who is well informe estimates that there are twenty million teeth extracted in this country every year, and at least eight million of artificial ones made. When we consider the various expressions of feeling shown by the face, and the importance of the teeth in speaking and mastication, we may form some estimate of the necessity of replacing them when lost.

In using single teeth it is necessary to have some substitute for the gum. We have two such that answer the purpose well — the continuous-gum body and celluloid. Continuous gum-work has been before the profession so long and its merits have been so highly extolled that I shall give it not more than mention. It certainly makes the most perfect work when it can be used; but there are objections to it — it is heavy, liable to break, and not easily repaired. It has been in use more than thirty years, during which time it has been tried by many who have discarded it, and it does not appear to be increasing.

Celluloid, when properly made, answers the purpose well. It is more easily managed, lighter, can be easily repaired, and may be made to imitate the natural gum very closely. It is not necessary to give the chemical composition of this compound. It is known to be made from gun-cotton by adding camphor and some oxide of zinc; a little vermillion is also added to give it color. It softens to a doughy consistence at a temperature of 300° F., when it may be pressed in molds to any shape, with no liability to spring or warp.

Single teeth mounted on a gold plate, using celluloid to form

a continuous, natural, and life-like gum, make the most satisfactory cases for both the operator and the patient.

Figure No. 1, showing single teeth mounted on gold plate.

Figure No. 2, the same, finished with celluloid gum.

GOLD WORK.

THE instructions published in text-books on working gold are very diffuse; a consecutive method may facilitate matters. First surround the model, coated with sandarac varnish, with the large ring of a Bailey flask. Sift moulding-sand into the ring, with a blunt point tamp around the model until it is held firmly in the centre of the ring, fill the ring with sand and press it down with the fingers, form a conical heap of sand on top, with a heavy hammer condense it with one or two blows, scrape off the surplus, turn the flask over, condense and bevel the sand around the model with a spatula, then with a small hammer tap the model gently all around until it is loose; it can then be safely withdrawn. Elevate the ring, and with the spatula concave the sand on the under side to within a quarter of an inch of the mould, using the thumb and finger for calipers. Sand should be wet and left to temper over night, the following morning sifted into a tin box, and covered tightly. It will then be always ready to mould. Sand which has been used a long time for fine castings is better than new sand.

In partial sets cut the teeth off of the plaster model and scrape a socket where each tooth stood. It will then require a smaller piece of plate, and strike up more readily.

Heat the zinc in a very large, thick ladle. Before it all melts, take it off the fire, let it cool as long as you can and yet have sufficient to fill the mould and nearly fill the ring. Replace the ladle on the fire, to keep the zinc melted. When the die cools there will be a hole in the centre. Fill this hole with the melted zinc, then there will be a flat surface to pound in swedging. Knock the sand out, and fill with lead, very hot. Make three lead matrices to each zinc die. Fit a sheet of common tin-foil to the die, cut a V-shaped piece out at the frænum in front, then the pattern will lie around the alveola ridge without folding. Cut the

gold plate the same shape as the pattern. Anneal the plate, that is, heat it cherry-red with a blow-pipe flame, cool in water. With a horn-mallet dapper into shape on the die. Boil the plate in sulphuric acid and water until bright. Use a hammered copper ladle. If any zinc or lead adheres to the gold, scrape it off before annealing, or it will eat into the plate. Anneal; place the plate between the die and matrix on an anvil, zinc up. Strike one or two heavy, dead, pushing blows, and not several quick, springing blows, or the plate will be wrought into a dense spring, which will not fit, but will rock on the die and in the mouth. Adjust the plate with as little hammering as possible. Try the plate in the mouth, and file to the desired shape. Bend a strip of gold, one-eighth of an inch wide, around the top edge of the plate, hold it in position with iron-wire clamps, and solder where the band touches the plate, by heating the plate from the opposite side from the band; the solder will then flow without melting the band. With pliers press the band close to the plate all around, and solder as before. Of course, attach one edge of the band only to the edge of the plate. Arrange the teeth by pressing them against a wall of wax, stuck on to the plate. Bury the plate and teeth in plaster and asbestos batter; leave the wax and roof of the plate uncovered. When the batter is hard, remove the wax. The teeth are now to be provided with a single or continuous gold backing. Pick out the second molar, cut a scrap of plate narrower and longer, punch holes to admit the platinum pins, file to the required shape, countersink the holes; with the spring bender-pliers concave slightly the side that comes next to the tooth, file across the edges on this side until they come to a bearing on the tooth, slip the backing in position, and split the pins; riveting is apt to strain the tooth, after which it will surely crack when soldered. Continuous backing is formed to join between the teeth. Spread on sufficient fresh batter to hold the teeth in position. Grind borax against a slate with water on it until the mixture is sticky; a few drops of alcohol will improve it. With a camel's-hair brush touch the pins and joints; solder will flow wherever the borax spreads, so be particular to stick the borax only where solder is required. Cut solder into small pieces, place a row around the plate-joint. Heat the asbestos and plaster until the plate is a

light cherry-red. Solder by first heating the investment back of each tooth; while hot, flow the solder on the plate-joint. The less solder used the better. Then place solder on the pins and joints between the teeth, if it is a continuous backing. When the solder ceases to flow readily, it is best to put the piece back on the fire. More mischief is done by trying to flow solder on a cold piece than in any other way. After the piece is soldered perfectly, let it cool slowly in a warm place; clean by boiling in the pickle. Finish with files, burrs, scrapers, and pumice. Polish with a chamois-wheel; use crocus, or rouge. Put on the celluloid gum; carve and finish; wash thoroughly with soap and water. With pliers place it in the gilding fluid, after which polish again. Where the gold plate has been touched with the fingers, the gilding will not be deposited.

To make 18-karat gold plate tough and free from blisters, requires an expert melter. To free the stock of blisters, necessitates a white heat just before pouring, but the more heat the more brittle the plate is. I have seen 18-karat stock that a cube had been cold-punched out of. The ingot should be reduced to the desired thickness by once passing through the rolls, if possible; that makes metal tough. It is well to immerse the piece in ammonia water, if you have trouble with solder not flowing where needed; solder will not flow on or over acid.

Use 14-karat solder on 18-karat gold plate.

Spring stock should be 14-karat, with a little platinum in the alloy, to make it stand more heat than the solder.

Teeth crack in soldering, if the pin is expanded before the porcelain is hot.

The slate and borax must be kept perfectly clean.

For further points and explanations, see text-books.

Celluloid Gum on Gold Plate.

When the case is ready to put the gum on, it presents the same appearance as shown in Figure 1, front page. Fill the groove with paraffine. Invest the plate in batter of $\frac{2}{3}$ plaster and $\frac{1}{3}$ fine sand in the nowel. The piece may be invested with the teeth pointing either up or down, the object being to force the celluloid

gum into position by direct pressure, if possible. The plaster in the cope is used as a form to press the celluloid into place; the bottom edge should be beveled out so as not to push the celluloid strip down and away from the groove. Lock the flask and dry it out in the oven one and a quarter hours, when the machine is cold, and fifteen minutes less when hot. Saw off the rim of a celluloid blank, boil it in hot water, press it into place, put on the cope, and mould in the oven. Little or no pressure should be applied for the first five minutes, to allow the celluloid time to soften, then with the thumb and fingers turn the T wrench very gently. At the end of ten minutes, turn the heat off. When the flask is closed, lock, remove from the oven, and immerse it in cold water.

The S. S. White Dental Manufacturing Company have made some stained single teeth for the new gold work. They are superior in shape, color, length of cusp, arrangement of pins, and are, in fact, a great improvement over any teeth ever offered to the profession. I prefer their sheet paraffine and sticks.

Gold Solution.

Dissolve the gold in aqua regia (one part nitric to two parts of muriatic acid).

Evaporate nearly dry.

Dilute with water.

Precipitate the gold with aqua ammonia.

Take up the precipitate with cyanide of potassium, ½ oz. to 1 dwt. of fine gold.

Filter clear.

The plate to be gilded is first polished and washed perfectly clean. After washing do not touch it with the fingers.

Put it in the fluid and place a strip of zinc against it. When coated with the brown precipitate, remove, wash and polish. This process may be repeated several times, until the desired color is reached.

PROPOSITION.

THE Seabury Vulcanizer and Celluloid Press, two Seabury dental flasks, one T wrench, one bar wrench, and a gas or gasoline burner will be shipped on receipt of the price, $200.

A gas burner will be sent unless otherwise ordered.

Extra flasks $5 each.

Bloodstone burnisher, $5. Bloodstone is better adapted for burnishing tin-foil on to paraffine than either steel or agate.

Heavy tin-foil, which will peel off celluloid plates without parting, $1 a pound.

Any material required in following these instructions, which cannot be obtained of good quality at the dental depots, I will supply.

TESTIMONIALS.

THESE testimonials are from the gentlemen who have had the longest experience in working the machine, and who are therefore amply able to judge of its superiority.

Prof. Thomas H. Chandler has taken an interest in my experiments from the first, and through him the Harvard Dental School received one of the first Seabury Vulcanizers completed. The students are now using it with entire satisfaction, as is also the Demonstrator in charge, Dr. J. Ellsworth Waitt.

BOSTON, Nov. 1, 1884.

Dr. F. W. Seabury.

DEAR SIR: After careful study and practical use of your new apparatus, I am more than pleased with it.

The marked difference in vulcanite and celluloid work, as compared with the old methods, speaks *volumes* for it.

Yours very truly,

J. ELLSWORTH WAITT.

422 Columbus Ave.

FALL RIVER, MASS., Oct. 23, 1884.

Dr. F. W. Seabury.

DEAR DOCTOR: I have been using your new Dental Vulcanizer about four months, and am more than pleased with the results. I find that vulcanite dentures can be made much thinner and lighter, on account of the increased density and toughness obtained. Also, a higher polish with less work can be secured. For celluloid and zylonite I am convinced of its superiority over all others now in use; and with this machine, in the hands of skillful mechanical dentists, I shall expect the nearest approach to the perfect plate that the profession has ever yet produced.

Yours very truly,

R. M. CHIVERS.

BOSTON, MASS., Nov. 1, 1884.

Mr. F. W. Seabury, Providence, R. I.

DEAR SIR: In reply to yours of yesterday, about your Vulcanizer, would say that in our experience as manufacturers of rubber goods we have never seen a Vulcanizer for small work, constructed on any principle, which reached the perfection in vulcanizing that is reached by your Vulcanizer. Nothing is more important in the manipulation of rubber than to have it vulcanized in the best possible manner, and your Vulcanizer should have a large sale when its merits are known.

Yours truly,

BOSTON RUBBER CO.,
GEO. H. HOOD, *Treas.*

ST. LOUIS, MO., Oct. 25, 1884.

To Dr. F. W. Seabury.

DEAR DOCTOR: I have now used the Seabury Vulcanizer long enough to be fully satisfied of its great superiority over any others of which I have any knowledge. The rubber comes out stronger, more elastic, and of better color, especially when pink rubber is used. For the manipulation of celluloid it has, in my opinion, no equal.

C. W. SPALDING, D. D. S., M. D.

NEW YORK, Oct. 28, 1884.

Dr. Seabury.

MY DEAR SIR: I cannot but think that the dental profession are greatly indebted to you for presenting them with the most perfect and complete apparatus for Vulcanite, and the working of celluloid (combined in one machine), that has ever before been produced. It seems to me that your machine is absolutely perfect in all its appointments, and in its results. I remain yours very truly,

A. C. HAWES,
of HAWES & PAYNE, 22 W. 38th St.

PROVIDENCE, Sept. 29, 1884.

Dr. F. W. Seabury.

MY DEAR DOCTOR: I am convinced that your new Vulcanizer is more perfect in construction and material, and answers more nearly in correct principles of design to the work it is intended to do, than any other Vulcanizer ever offered to the dental profession.

Adapted as it is to the working of both celluloid and rubber, it affords the convenient opportunity to such dentists as are unwilling to be restricted to the use of one plastic material, of doing both kinds of work with one compact and scientifically-made apparatus.

That by the use of this Vulcanizer, combined with the use of the seemingly perfect flasks which accompany it, an intelligent dentist should be able to secure more definite and satisfactory results both for his patients and himself, than from the use of any other Vulcanizer now in use, I have no doubt. WILLIAM BARKER, D. D. S.,

President of the New England Dental Society.

WORCESTER, MASS., Oct. 29, 1884.

Dr. F. W. Seabury.

DEAR DOCTOR: In reply to yours of last week, will state that up to the present time I have not had a failure; it is not an easy matter for me to comprehend how *any one* can. For it is simple, convenient, compact, and thoroughly constructed, safe and reliable. It is *the* Vulcanizer for every dentist who desires to produce the best possible results with celluloid and rubber. Respectfully yours,

C. FRANK BLIVEN.

WARREN, R. I., Oct. 23, 1884.

Dr. F. W. Seabury, Providence, R. I.

DEAR SIR: In reply to yours of the 22d inst., will say that the Vulcanizer purchased of you is giving perfect satisfaction in every particular. I consider it the most valuable piece of laboratory apparatus I have ever seen. Yours truly,

PRESTON DAY.

NEW BEDFORD, Oct. 5, 1884.

Dr. F. W. Seabury.

MY DEAR DOCTOR: Received your note in regard to giving my opinion in behalf of your Vulcanizer.

I have been so driven with operating that I have not given the Vulcanizer any attention. But it has been worked constantly by my assistant. I have been very much pleased with the results, and should not like to part with the machine.

I am very truly yours,

E. V. McLEOD.

---

142 BOYLSTON ST., BOSTON, Sept. 16, 1884.

To Dr. F. W. Seabury.

MY DEAR DOCTOR: Your note, asking me what I think of your Vulcanizer, is received. In answer I would say that I think it about perfect, both rubber and celluloid always coming out perfect, if one understands the Vulcanizer thoroughly. I think any cause of failure will be found to be due to carelessness, or want of knowledge of the Vulcanizer.

Yours truly,

C. S. BARTLETT.

NEW BEDFORD, Sept. 14, 1884.

MY DEAR DOCTOR: As you desire my opinion of your Vulcanizer, I am glad to say that, after using it for about three months, I find it is constantly growing in my esteem. Its absolute safety from explosion is a very important advantage over anything I have before used.

The method of vulcanizing a plate in such a manner as to need no scraping to reduce its thickness after it comes out of the flask, renders it denser, tougher, and therefore more durable.

In addition to its use for rubber dental plates, its adaptability for easily exerting the necessary amount of pressure at the right moment of the proper temperature of the flask, in the working of zylonite, or celluloid, is a feature that, so far as I know, has not hitherto been obtained.

I heartily congratulate you, my dear Doctor, as the author of an apparatus so well calculated to aid our profession in improving Dental Art.

With sincere respect, I am very truly yours.

C. G. DAVIS.

To Dr. F. W. Seabury, Providence, R. I.